Report of the 12th Session of the IOTC Working Party on Data Collection and Statistics

Victoria, Seychelles, 28-30 November 2016

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ACRONYMS

ALB	Albacore
ABNJ	Areas Beyond National Jurisdiction
BET	Bigeye tuna
BOBLME	Bay of Bengal Large Marine Ecosystems Project
CMM	Conservation and Management Measure (of the IOTC; Resolutions and Recommendations)
CPCs	Contracting parties and cooperating non-contracting parties of the IOTC
DGCF	Directorate General of Capture Fisheries of Indonesia
DFAR	Department of Fisheries and Aquatic Resources of Sri Lanka
EEZ	Exclusive Economic Zone
EU	European Union
FAD	Fish aggregating device
FMA	Fisheries Management Area
GEF	Global Environmental Facility
ICCAT	International Commission for the Conservation of Atlantic Tunas
IOC	Indian Ocean Commission
IOTC	Indian Ocean Tuna Commission
I.R. Iran	Islamic Republic of Iran
ISSF	International Seafood Sustainability Foundation
IFDCS	Iran Fishery Data Collection System
NARA	National Aquatic Resources Research and Development Agency of Sri Lanka
OFCF	Overseas Fishery Cooperation Foundation of Japan
RFMO	Regional Fisheries Management Organization
ROS	Regional Observer Scheme
Taiwan,China	Taiwan Province of China
USTA	*Unité Statistique Thonière d'Antsiranana*
VMS	Vessel Monitoring System
WPB	Working Party on Billfish of the IOTC
WPDCS	Working Party on Data Collection and Statistics of the IOTC
WPEB	Working Party on Ecosystems and Bycatch of the IOTC
WTmT	Working Party on Temperate Tunas of the IOTC
WPNE	Working Party on Neritic Tunas of the IOTC
WPTT	Working Party on Tropical Tunas of the IOTC
WWF	World Wide Fund for Nature
YFT	Yellowfin tuna

STANDARDISATION OF IOTC WORKING PARTY AND SCIENTIFIC COMMITTEE REPORT TERMINOLOGY

SC16.07 (para. 23) The SC **ADOPTED** the reporting terminology contained in Appendix IV and **RECOMMENDED** that the Commission considers adopting the standardised IOTC Report terminology, to further improve the clarity of information sharing from, and among its subsidiary bodies.

HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

Level 1: ***From a subsidiary body of the Commission to the next level in the structure of the Commission:***
RECOMMENDED, RECOMMENDATION: Any conclusion or request for an action to be undertaken, from a subsidiary body of the Commission (Committee or Working Party), which is to be formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g. from a Working Party to the Scientific Committee; from a Committee to the Commission). The intention is that the higher body will consider the recommended action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally this should be task specific and contain a timeframe for completion.

Level 2: ***From a subsidiary body of the Commission to a CPC, the IOTC Secretariat, or other body (not the Commission) to carry out a specified task:***
REQUESTED: This term should only be used by a subsidiary body of the Commission if it does not wish to have the request formally adopted/endorsed by the next level in the structure of the Commission. For example, if a Committee wishes to seek additional input from a CPC on a particular topic, but does not wish to formalize the request beyond the mandate of the Committee, it may request that a set action be undertaken. Ideally this should be task specific and contain a timeframe for the completion.

Level 3: ***General terms to be used for consistency:***
AGREED: Any point of discussion from a meeting which the IOTC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 or level 2 above; a general point of agreement among delegations/participants of a meeting which does not need to be considered/adopted by the next level in the Commission's structure.
NOTED/NOTING: Any point of discussion from a meeting which the IOTC body considers to be important enough to record in a meeting report for future reference.

Any other term: Any other term may be used in addition to the Level 3 terms to highlight to the reader of and IOTC report, the importance of the relevant paragraph. However, other terms used are considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3, described above (e.g. **CONSIDERED**; **URGED**; **ACKNOWLEDGED**).

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EXECUTIVE SUMMARY

The 12th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Data Collection and Statistics (WPDCS) was held in Victoria, Seychelles, from the 28th to the 30th of November 2016. A total of 32 participants attended the Session.

The following are a subset of the complete recommendations and decisions from the WPDCS12 to the Scientific Committee, which are provided at Appendix VI.

Further analysis of length frequency data and likely impacts on the assessments

WPDCS12.01 (para. 72): The WPDCS **RECOMMENDED** that a collaborative work on longline size frequency data gathering scientists from Taiwan,China, Japan, Seychelles and Korea could be conducted in 2017 in conjunction with the joint CPUE workshop, to compare the different data sets available and extract information useful for the future stock assessments of yellowfin, bigeye and albacore tuna.

Resolution 15/02 Mandatory statistical requirements for IOTC Members and Cooperating Non-Contracting Parties (CPCs)

WPDCS12.03 (para. 89): The WPDCS also **NOTED** the conceptual model adopted by ICCAT in its field manual to describe all quantities involved in the determination of retained / total catch and **RECOMMENDED** that a similar approach is adopted and used to provide clearer, more formal definitions of the depicted relevant concepts.

Resolution 16/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock

WPDCS12.04 (para. 95): The WPDCS **RECOMMENDED** that a project be included in the WPDCS program of work to support CPCs in the improvement of their national data collection systems to support the implementation of Resolution 16/01 *On an interim plan for rebuilding the Indian Ocean Yellowfin tuna stock*; specifically estimates of fleet composition, time-area catches (and associated catches on the high seas for vessels under 24 metres), and efficiencies in the time required to assess the status of Yellowfin tuna catches.

Resolution 16/04 On the implementation of a pilot project in view of promoting the regional observer scheme of IOTC

WPDCS12.05 (para. 102): Resolution 11/04 *On a Regional Observer Scheme* requests the submission of a report after each trip but the WPDCS **RECOMMENDED** that on the next revision of the Resolution, this should be amended to request the submission of data (instead of the observer trip report) with a given deadline so that information from multiple trips can be provided. The WPDCS also NOTED that once the electronic reporting system is developed and established observer information could be submitted by a certain deadline as it is done with Nominal Catch and Catch and Effort data.

Revision of the WPDCS Program of work (2017–2021)

WPDCS12.10 (para.153): The WPDCS **RECOMMENDED** that the Scientific Committee consider and endorse the WPDCS Program of Work (2017–2021), as provided at Appendix V.

Review of the draft, and adoption of the report of the 12th Session of the WPDCS

WPDCS12.12 (para.158): The WPDCS **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPDCS12, provided at Appendix VII.

1. OPENING OF THE MEETING

1. The 12th Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Data Collection and Statistics (WPDCS12) was held in Victoria, Seychelles from the 28th to the 30th November 2016. A total of 32 participants (20 in 2015, 30 in 2014, 23 in 2013) attended the Session. The list of participants is provided at Appendix I. The meeting was opened on 28 November 2016 by the Chairperson, Dr Emmanuel Chassot (EU,France) who welcomed participants to Seychelles.

2. ADOPTION OF THE AGENDA AND ARRANGEMENT FOR THE SESSION

2. The WPDCS **ADOPTED** the Agenda provided at Appendix II. The documents presented to the WPDCS12 are listed in Appendix III.

3. THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS

3.1 Outcomes of the 18th Session of the Scientific Committee

3. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–03 which outlined the main outcomes of the 18th Session of the Scientific Committee (SC18), specifically related to the work of the WPDCS.

4. The WPDCS **NOTED** that in 2015, the SC made a number of requests in relation to the WPDCS11 report (noting that updates on Recommendations of the SC18 are dealt with under Agenda item 3.4). Those requests and the associated responses from the WPDCS12 are provided below for reference.

- ***General discussion on data issues***

  (Para. 73) *The SC **NOTED** that, given that catches of many IOTC species are accounted for by a small number of CPCs, the data gaps for major IOTC species could be addressed to some extent through data support and compliance missions, and capacity building focused on long term investments in data collection and reporting systems, particularly for coastal fisheries important for catches of IOTC species (e.g. Indonesia, Oman, Sri Lanka, India, Pakistan, Yemen, I.R. Iran). As a matter of priority, capacity building for fishery monitoring and data collection should be focused on those countries.*

  - **Response:** The WPDCS **NOTED** that a number of capacity building activities (see paper IOTC-2016-WPDCS12-08 for more details) scheduled for 2015/2016 which include data compliance missions to Indonesia, and support for the Regional Observer Scheme in Sri Lanka, Pakistan and I.R. Iran, including development of a pilot Electronic Monitoring project, focused on improving data collection from coastal fisheries.
  - (Para 77.) ***NOTING** that total catches for Yemen have been repeated in the IOTC database since 2012, due to the lack of information available to the IOTC Secretariat, the SC **REQUESTED** that the IOTC Secretariat conduct a thorough review of alternative information available to estimate the recent catches for Yemen (for example, using information available on international trade data)*
  - **Response:** The WPDCS **NOTED** that since WPDCS11, the IOTC Secretariat has updated the catches for Yemen based on FAO estimates – although the quality of catches remains highly uncertain – and **ENCOURAGED** the IOTC Secretariat to dedicate resources to further improve the catch estimates in the IOTC database, given the importance of Yemen to catches of tropical and neritic tuna species in particular.
  - (Para. 73) The SC **NOTED** that, given that catches of many IOTC species are accounted for by a small number of CPCs, the data gaps for major IOTC species could be addressed to some extent through data support and compliance missions, and capacity building focused on long term investments in data collection and reporting systems, particularly for coastal fisheries important for catches of IOTC species (e.g. Indonesia, Oman, Sri Lanka, India, Pakistan, Yemen, I.R. Iran). As a matter of priority, capacity building for fishery monitoring and data collection should be focused on those countries.

3.2 Outcomes of the 20th Session of the Commission

5. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–04 which outlined the main outcomes of the 20th Session of the Commission, specifically related to the work of the WPDCS and **AGREED** to consider how best to provide the Scientific Committee with the information it needs, in order to satisfy the Commission's requests, throughout the course of the current WPDCS meeting.

6. The WPDCS **NOTED** the 12 Conservation and Management Measures (CMMs) adopted at the 20th Session of the Commission (consisting of 12 Resolutions and 0 Recommendation) as listed below:

IOTC Resolutions

- Resolution 16/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock
- Resolution 16/02 On harvest control rules for skipjack tuna in the IOTC area of competence
- Resolution 16/03 On the second performance review follow-up
- Resolution 16/04 On the implementation of a Pilot Project in view of Promoting the Regional Observer Scheme of IOTC
- Resolution 16/05 On vessels without nationality
- Resolution 16/06 On measures applicable in case of non-fulfilment of reporting obligations in the IOTC
- Resolution 16/07 On the use of artificial lights to attract fish
- Resolution 16/08 On the prohibition of the use of aircrafts and unmanned aerial vehicles as fishing aids
- Resolution 16/09 On establishing a Technical Committee on Management Procedures
- Resolution 16/10 To promote the implementation of IOTC Conservation and Management Measures
- Resolution 16/11 On port state measures to prevent, deter and eliminate illegal, unreported and unregulated fishing
- Resolution 16/12 Working Party on the Implementation of Conservation and Management Measures (WPICMM)

7. The WPDCS **NOTED** that pursuant to Article IX.4 of the IOTC Agreement, the above mentioned Conservation and Management Measures became binding on Members, 120 days from the date of the notification communicated by the IOTC Secretariat in IOTC Circular 2016–054 (i.e., 27 September 2016).

8. **NOTING** that the Commission also made a number of general comments and requests on the recommendations made by the Scientific Committee in 2015, which have relevance for the WPDCS (details as follows: paragraph numbers refer to the draft report of the Commission (IOTC–2016–S20–R)) the WPDCS **AGREED** that any advice to the Commission would be provided in the relevant sections of the report below.

*(Para. 13) The Commission **CONSIDERED** the list of recommendations made by the SC18 (Appendix VI) from its 2015 report (IOTC–2015–SC18–R) that related specifically to the Commission. The Commission ENDORSED the list of recommendations as its own, while taking into account the range of issues outlined in this Report (S20) and incorporated within Conservation and Management Measures adopted during the Session and as adopted for implementation as detailed in the approved annual budget and Program of Work.*

*(Para. 14) The Commission **NOTED** some minor improvements in the quantity of fisheries statistics available to the SC and its Working Parties in 2015 but reiterated its concerns about the lack of fisheries data from some gears and fleets for target and bycatch species. Specifically, many fisheries statistics are missing or incomplete for some industrial and artisanal fisheries.*

Regional Observer Scheme

*(Para. 33) The Commission **NOTED** with concern the low level of reporting to the IOTC Secretariat of both the observer trip reports and the list of accredited observers since the start of the ROS in July 2010. The Commission **NOTED** that capacity building activities continue to be supported via the Commission's annual budget, to improve compliance with the implementation of observer schemes by CPCs for their fleets and of reporting to the IOTC Secretariat as per the provisions contained within Resolution 11/04 on a Regional Observer Scheme.*

*(Para. 34) The Commission **NOTED** that CMM proposal IOTC–2016–S20–PropH will provide a discussion point for this agenda item, and which proposes the implementation of a pilot project in view of promoting the regional observer scheme of IOTC.*

3.3 Review of Conservation and Management Measures relevant to the WPDCS

9. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–05 which aimed to encourage participants at the WPDCS12 to review some of the existing Conservation and Management Measures (CMM) relevant to the WPDCS, noting the CMMs referred to in document IOTC–2016–WPDCS12–04, and as necessary to 1) provide recommendations to the Scientific Committee on whether modifications may be required; and 2) recommend whether other CMMs may be required.

10. The WPDCS **AGREED** that it would consider proposing modifications for improvement to the existing CMMs following discussions held throughout the current WPDCS meeting.

3.4 Progress on the recommendations of WPDCS11

11. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–06 which provided an update on the progress made in implementing the recommendations from the previous WPDCS meeting which were endorsed by the Scientific Committee, and **AGREED** to provide alternative recommendations for the consideration and potential endorsement by participants as appropriate given any progress.

12. The WPDCS **RECALLED** that any recommendations developed during a Session, must be carefully constructed so that each contains the following elements:
    - a specific action to be undertaken (deliverable);
    - clear responsibility for the action to be undertaken (i.e. a specific CPC of the IOTC, the IOTC Secretariat, another subsidiary body of the Commission or the Commission itself);
    - a desired time frame for delivery of the action (i.e. by the next working party meeting, or other date);
    - if appropriate, an approximate budget for the activity, so that the IOTC Secretariat may be able to use it as a starting point for developing a proposal for the Commission's consideration.

4. PROGRESS REPORT OF THE SECRETARIAT ON DATA RELATED ISSUES

4.1 IOTC Secretariat Report

13. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–07_Rev1 which provided an overview of the status of data holdings in the IOTC Secretariat, in particular statistics of catch, effort, size frequency and other biological data for IOTC species, sharks, and other species that are caught incidentally by fisheries directed at IOTC species.

14. The WPDCS **NOTED** that while there have been some progress in the timeliness of data reported to the IOTC Secretariat in recent years (e.g., in 2016 over 90% of nominal catches were reported according to the deadline), the overall quality in reported catches remains largely unchanged – and varies considerably according to species and fleet. The WPDCS further **NOTED** that the quality of the data available by species is also highly dependent on the importance of artisanal fisheries which tend to be the least well reported and often require to be partially adjusted or estimated by the IOTC Secretariat.

15. The WPDCS **RECALLED** that during the period of piracy in the late-2000's, the reduction in fishing effort (and catches) associated with industrial fleets operating in the north-west Indian Ocean led to relative decrease in the quality of catch estimates for these years, during which catches of artisanal fisheries accounted for an increasing proportion of total catches.

16. The WPDCS **AGREED** that the status of the datasets available at the IOTC Secretariat is a cause for concern for some of the important fleets that operate in the Indian Ocean, in particular, but not limited to:

Total catches (including retained catches, discards):

- On-going uncertainty in the total catches, species and gear composition reported for the coastal fisheries of Indonesia in recent years – particularly catches of small tunas around anchored FADs (Rumpons) and possible misidentification of juvenile yellowfin and bigeye tunas as neritic tuna species.
- Uncertain estimates of total catch for the commercial longline fishery of India; driftnet fishery of Pakistan; handline and driftnet fisheries of Yemen; and coastal fisheries of Madagascar.
- Catches not reported by species: requirement to estimate the catches of bigeye tuna on the majority of coastal fisheries, such as the pole-and-line fishery in the Maldives.
- Very poor reporting of data on the level of discards of tuna and tuna-like species, and incidentally caught species, across the majority of fisheries and time periods.

Catch-and-effort:

- Insufficient implementation of minimum requirements for operational catch-and-effort data, which compromise reporting of catch-and-effort statistics to the IOTC – including the longline fisheries of Indonesia and India; driftnet fisheries of I.R. Iran and Pakistan; gillnet and longline fishery of Sri Lanka.
- Lack of catch-and-effort and indices of abundance for coastal fisheries for the major tuna species and particularly neritic tuna species targeted by artisanal fisheries operating in India and Indonesia.

Size data:

- Lack of size frequency data for most major coastal fisheries, including the coastal longline fishery of India, the driftnet fishery of Pakistan, and coastal fisheries of Indonesia, India and Yemen, while other

fisheries such as I.R. Iran only partially report size data according to the IOTC standards (e.g., no information on grid area).
- Levels of coverage of size data for Japan and reliability of length frequencies available for longliners flagged in Taiwan,China in recent years (see section 5.2).

Regional observer data:

- Most levels of reporting of (industrial fisheries) observer coverage are below those recommended by the Commission (i.e., a minimum of 5% of the total number of fishing operations shall be covered by scientific observers).
- Little or no observer data collection by CPCs for artisanal fisheries. WWF has funded crew-based observer data collection for Pakistan gillnet in recent years, although no data has been submitted to the IOTC Secretariat, or for any other gillnet fisheries.

17. **RECALLING** its previous recommendation that scientists from Taiwan,China assist India in the estimation of catches of IOTC species and sharks for India's longline fleet, in particular for the years 2006 and 2007, the WPDCS **NOTED** with concern that while India had indicated that it will not work with external institutions to revise catch estimates for its fishery, India had not provided revised catches for its longline fleet.

18. The WPDCS **RECALLED** that the Scientific Committee had endorsed the alternative catches estimated for this component and **AGREED** that these estimates are maintained until India provides a revised time-series for its fleet.

19. **NOTING** that the above fisheries detailed above in paragraph 16 account for a substantial quantity of catches of IOTC species, the WPDCS **REQUESTED** that all of the CPCs listed address the issues identified, and report progress made at the next WPDCS.

20. The WPDCS **RECALLED** that the reporting of data, according to deadline of June 30th, as per the requirements of IOTC Resolution 15/02 is essential for assessing the status of the stocks availability of data for fisheries scientists.

21. The WPDCS **ENDORSED** the proposal from the IOTC Secretariat to undertake the necessary actions to address the issues for each fishery, as provided in Appendix IV.

4.2 Dissemination of IOTC Datasets and documents

4.2.1 IOTC Data Summary: Update

22. The WPDCS **RECALLED** that the current deadline for the stock assessment inputs and related datasets (including CPC standardized indices of abundance) is 45 days prior to Working Party meetings, and **ENCOURAGED** CPCs to provide stock assessment datasets to the IOTC Secretariat prior to the deadline to allow sufficient time for analysis by stock assessment experts, **NOTING** that many CPUE's were provided to the IOTC Secretariat in 2016 after the 45 day deadline.

23. The WPDCS further **NOTED** that data for the latest year is published by the IOTC Secretariat at the end of July, the 45 day deadline for publication of meeting datasets means that, in some cases, data for the latest year may not be available, particularly for the Working Party on Billfish and Working Party on Ecosystems and Bycatch which generally are scheduled for early-September.

24. The WPDCS **NOTED** the excellent progress of the IOTC Secretariat regarding development of the new IOTC database, which is due to be completed in early-2017, and aims to consolidate the range of current IOTC datasets and in-house databases into a single centralized platform that will facilitate improvements in the processing, validation, dissemination and visualisation of datasets required by the IOTC Working Parties, the Scientific Committee, and stock assessment experts.

4.2.2 Tagging database: Update

25. The WPDCS **NOTED** the update provided on the status of the IOTC tagging database, and that this work is extremely valuable for a range of scientific studies, including stock assessment models – although only a small number of recoveries are now being reported, over ten years since the original tagged releases.

26. The WPDCS **CONSIDERED** the future of the tagging database in terms of data archival, consolidation of the tagging database within the new integrated IOTC database, and improvements to the dissemination to ensure the data is utilized as fully as possible, and **REQUESTED** the IOTC Secretariat to liaise with other organizations to explore options for improving the accessibility of the data, including the description of the database with standard

metadata and data formats (e.g. FAO Geonetwork catalogue and Global Biodiversity Information Facility formats).

4.2.3 IOTC website data pages: Discussion of potential improvements

27. **NOTING** the importance of transparency, full documentation and reproducibility of the stock assessment results, the WPDCS **REQUESTED** the IOTC Secretariat to explore ways of improving the archive and dissemination of stock assessment input, output and control files (including executable versions of the models) on the IOTC website.

28. In addition, the WPDCS **REQUESTED** that the IOTC Secretariat explore ways in which the new integrated IOTC database can be used to improve the dissemination of IOTC datasets, through interactive maps, dynamic charts, tables and other tools to facilitate the accessibility of the data for end users, thereby reducing the burden on the IOTC Secretariat in terms of the standard range of charts and maps produced prior to each Working Party.

29. The WPDCS **NOTED** paper IOTC-2016-WPDCS12-INF06 that provides suggestions for improved figures to be used in the tropical tunas statistical summaries, presented at the WPTT18 including the following abstract provided by the authors:

> "*In this paper, we undertake a critical review of the figures included in the tropical tuna 2015 reports presenting the main statistics of tropical tunas. The main outcome is that several of these figures do not reflect the information in the most appropriate manner, notably missing to showcase interesting characteristics and changes in the tropical tuna fisheries. Hence, we propose various alternative or additional figures concerning fishing maps, catch at size and numbers of fish sampled for purse seine and combined fisheries, rates of log book data, fishing maps and tag-recoveries maps, yearly average weights combining catches by all gears, etc. Our recommendation is that new figures should preferably be presented in the appendix of the TT report, as they are more informative than the current figures. Our conclusion is that these appendices are very important and that they should be better examined and validated each year by the species working groups."*

30. The WPDCS **NOTED** that the requests and suggestions provided by this paper should be brought to the attention of the SC prior to be discussed and possibly incorporated as standard figures and charts in the future.

5. UPDATE ON NATIONAL STATISTICS SYSTEMS

5.1 Update on national statistical systems, including the main challenges in collecting and reporting data to the IOTC Secretariat and proposals to improve future levels of compliance with IOTC data requirements

5.1.1 Kenya data collection systems

31. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–10 which described the results from a new sampling data collection system in Kenya implemented in 2013-2016 aimed at improving the deficiencies in the previous data collection system, including the following abstract provided by the author:

> "*Due to inadequacy in the total enumeration data collection system previously undertaken by the State Department of Fisheries and Blue Economy in Kenya, a sampling data collection system was undertaken in 2013 to improve on the deficiencies of the previous system. This report looks at the outputs for the first year where 9,063 tons were reported from the routine data collection compared to 15, 795 tons from the sampling system* (…)" – see paper for full abstract

32. The WPDCS **NOTED** the value of the new sampling program implemented in Kenya, and **ENCOURAGED** Kenya to continue efforts in improving their data collection programs.

33. The WPDCS **NOTED** that it is common to observe differences in the data when a data collection program is modified, and it can be difficult to determine which data are more reliable. The WPDCS **AGREED** that the new sampling program is likely to provide more reliable data than the previous data collection program because it provided a greater coverage across landing sites and gear types.

34. The WPDCS **NOTED** the difficulties in obtaining accurate fishing location information from fishers, which could only be validated by GPS for a small proportion (approximately 10%) of locations.

35. The WPDCS **NOTED** Kenya's request for assistance in terms of the evaluation of the Catch Assessment Survey, including understanding inconsistencies with the results of the previous data collection system, and **REQUESTED** that the IOTC Secretariat conduct a technical assistance mission to assist with analysis of the

survey results, and provide support for development of a proposal for an electronic sampling data collection system.

5.1.2 I.R. Iran improvements in Data Collection and Statistics

36. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–11 which provided an overview of the data collection program in Iran, including the following abstract provided by the author:

> "*This document presents summary information about fisheries statistical data in Iran, according to IOTC resolutions and recommendations concerning mandatory minimum data submit to IOTC and basic actions to improving Data collection system with approvals and recommendations of the Scientific Committee and WPDCS11* (…)" – see paper for full abstract

37. The WPDCS **WELCOMED** the efforts by Iran in improving their data collection program, including the collection of size data and location of fishing activities, and **ENCOURAGED** Iran to continue efforts to improve data collection.

38. The WPDCS **NOTED** that fishing location information was recorded by portable GPS systems and it is difficult to validate information because VMS data is not available.

39. The WPDCS **ENCOURAGED I.R. Iran** to provide more information about the catches from gillnet fisheries operating near Somalia, including total catches and species composition, as currently there is a lack of data from this area.

40. The WPDCS **NOTED** that accurate location information is potentially available within logbook forms provided to Iranian fishermen, and **REQUESTED** that I.R. Iran considers providing catch and effort and size data according to IOTC Resolution 15/02 standards.

5.1.3 Malaysia improvements in Data Collection on Tuna Landings

41. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–12 which provided an overview of the data collection program in Malaysia, including the following abstract provided by the author:

> "*Fisheries data collection system undertaken by the Department of Fisheries Malaysia is one of the important program for the purpose of fisheries management. Currently the fisheries statistical data collection Section is under the Development and Planning Division in the DoF Headquarter. Recording of catch data for tuna is similar as other fish species, collected according the sampling program established by the Department of Fisheries.* (…)*"* – see paper for full abstract

42. The WPDCS **NOTED** the progress in improving the data collection program in Malaysia, including the implementation of a port-based Vessel Operation Report (LOV) for coastal fisheries, and **ENCOURAGED** Malaysia to continue efforts to improve data collection.

43. The WPDCS **NOTED** that data from logbooks were considered unreliable for coastal fisheries because they were completed by the fishers who may misreport data. The Vessel Operation Reports (LOV) were considered more reliable as they were completed in port by fisheries officers.

44. The WPDCS **ENCOURAGED** Malaysia to work with the fishers to ensure proper filling of the logbooks as a complement to the LOV.

5.1.4 Mozambique Data Collection and Reporting of artisanal fisheries

45. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–13 which provided an update on the status of data collection for artisanal fisheries in Mozambique, including the following abstract provided by the author:

> "*Mozambique exhibits a consolidated data collection system for the artisanal fishery (SNAPA). Data collected include gear, effort, species and length of same of dominant species. However, because of the complexity of its artisanal fishing sector, the country, as many other IOTC coastal states, continues to face challenges regarding collection and reporting artisanal tuna fisheries statistics, as requested by IOTC.* (…)" – see paper for full abstract

46. The WPDCS **NOTED** the progress in improving the data collection program in Mozambique, including the pilot program for monitoring artisanal fisheries, and **ENCOURAGED** Mozambique to continue efforts to improve data collection.

47. The WPDCS **NOTED** that small juvenile yellowfin and bigeye tuna are expected to be present in Mozambique due to the proximity to the known spawning grounds and the direction of larval drift. However, small yellowfin

and bigeye tuna (< 20 cm) were not observed because the main fishing gears used to catch tuna in Mozambique are purse seine and line fishing which are not selective for these small fish.

48. The WPDCS **NOTED** that there are issues with species identification and **ACKNOWLEDGED** that enumerators can record species as an aggregate when unsure about the identification. The Secretariat can then estimate the species composition from the aggregated data.

49. The WPDCS **NOTED** that IOTC species were not a priority for biological data collection in artisanal fisheries, considering that the system was developed before Mozambique joined the IOTC and **ENCOURAGED** Mozambique to improve tuna data collection from artisanal and recreational fisheries including size-frequency data.

50. The WPDCS also **NOTED** the IOTC mission to Mozambique aimed at improving reporting of catch and effort from the Mozambique industrial fisheries and the foreign vessels landing in Mozambique and **ENCOURAGED** Mozambique to continue reporting the industrial and recreational data.

51. The WPDCS **NOTED** the request from Mozambique for assistance from the IOTC Secretariat in making available the IOTC Species Identification cards into Portuguese to facilitate Mozambican enumerators in correct species identification.

52. The WPDCS **NOTED** the request from Mozambique to the IOTC Secretariat for assistance in conducting species identification training for its enumerators in 2017.

5.1.5 Sri Lanka electronic logbook and electronic data verification

53. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–14 which describes a pilot project for the implementation of a unique electronic logbook system for Sri Lankan fisheries, including the following abstract provided by the author:

> "*Department of Fisheries and Aquatic Resources had introduced logbooks to collect spatial and location wise catch data since 2012. Logbooks on board for high seas fishing vessels is obligatory requirement of IOTC resolutions and managing logbook data is a crucial part of managing IUU fishing. Logbooks and log book data were decisively combined with the high seas fisheries management process of Sri Lanka under the road map to revoke EU fish export ban. Accordingly a systematic approach to develop a database was also initiated in 2015* (…)" – see paper for full abstract

54. The WPDCS **CONGRATULATED** Sri Lanka on the implementation of a successful electronic logbook pilot project, and **ENCOURAGED** Sri Lanka to continue the development and expansion of the program to other vessels and fleets, including coastal fisheries.

55. The WPDCS **NOTED** the elegant simplicity of the electronic logbook design, which utilised pictograms on the user interface to simplify data entry, in combination with a sophisticated and automated location and reporting system.

56. The WPDCS **NOTED** the potential value of this electronic logbook for other CPC coastal fisheries, and **ENCOURAGED** Sri Lanka to share the source code with the Secretariat to determine whether it could be tailored to other CPCs, thus ensuring that the value of the data collected through the electronic logbooks is maximised.

57. The WPDCS **NOTED** that it will be important to standardise the data collected from electronic logbook systems to fulfil IOTC data requirements needs, and **ENCOURAGED** the Secretariat to assess whether the EU electronic logbook system – based on UN-CEFACT standards – could provide a viable alternative for developing countries as well.

5.1.6 Thailand onboard observer program

58. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–15 which described the process in establishing the fisheries observer program for Thai fishing vessels, including the following abstract provided by the authors:

> "*The program of Thai Fisheries Observer Onboard has been established under the Marine Fisheries Management Plan (FMP) 2015-2019 in order to decrease the problem of illegal, unreported and unregulated fishing (IUU fishing). The Fisheries Observer Onboard Program has been started with the development of observer onboard for fishing vessels operating on the high seas, which are the areas of competence of Regional Fisheries Management Organizations (RFMOs) for the purpose of strengthening the monitoring, control and surveillance system (MCS) to be more effective.* (…)" – see paper for full abstract

59. The WPDCS **NOTED** that Thailand has successfully trained the first batch of observers in 2015 and 2016 as part of the wider implementation of the Regional Observer Scheme in Thailand.

60. The WPDCS **NOTED** that there are currently 6 trained observers placed on trawlers operating in the high seas, but there are no observers are currently deployed on longline vessels until current licensing issues with the Thai fleet have been resolved (possibly in 2017).

5.2 Further analysis of length frequency data and likely impacts on the assessments

61. The WPDCS **NOTED** that Taiwan,China is currently analysing size data collected aboard Taiwanese longliners, and that some large heterogeneity has been found in the way the length data are collected by fishing crews.

62. Furthermore the WPDCS **NOTED** that length collected from observers-at-sea as well as individual weights recently collected by the crews should be compared, and **REQUESTED** that Taiwan,China submit observer size frequency data to the IOTC Secretariat.

63. The WPDCS **ENCOURAGED** Taiwan,China to continue to work with the IOTC Secretariat to further understand the inconsistencies between average weights derived from size frequency data and catch-and-effort data and **REQUESTED** Taiwan,China to report the work to the next WPTT and WPDCS.

5.2.1 Difference of average weight by estimation method for tunas caught by Japanese longline

64. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–16 which described the reasons behind the differences in tunas average weight between catch-and-effort and size-frequency data reported by Japan, including the following abstract provided by the author:

> "*The reason for the difference of average weight of tunas caught by Japanese longline in the Indian Ocean between by catch and effort data and by size data was considered. Overview of size sampling and estimation of average weight of fish in creating catch and effort data by Japanese longline is also described. The difference of average weight of the fish based on estimation method seems to be caused by the combination of (1) estimation process of average weight for catch and effort data which include substitution of size data, (2) difference of weight of the fish induced by slight difference of fish length, (3) potential difference of length-weight relationship used and (4) insufficient size sampling. Considering these issues, it seems to be not unnatural that such a difference of average weight occurs."*

65. The WPDCS **NOTED** the improvements made in the description of collection and processing of size frequency data as collected by Japan, that help understand issues observed in the data such as: differences in length between sampling protocols, use of substitution schemes in some years and low sample size especially since the early 2000s, and the lack of information on data processing used before 1993 for computing average weights.

66. The WPDCS **NOTED** that size data collected by Japanese training vessels in the eastern part of the Indian Ocean were possibly used in some years for estimating average weights in the western Indian Ocean, which might also explain some of the issues observed in the size data.

5.2.2 Review of Seychelles industrial longline size-frequency data

67. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–17_Rev1 which reviews information available for the Seychelles industrial longline fisheries and investigate the data quality for stock assessment including the following abstract provided by the authors:

> "*A large set of size data for yellowfin and bigeye tunas has been collected aboard Seychelles industrial longliners since 2007 and carefully checked and managed by the Seychelles Fishing Authority. Analysis of the data at the scale of the fishing operation shows that size frequency data collected at sea by fishermen are consistent with logbook information in several vessels while some data appear to be spurious. We also show that changes in spatial distribution of the longline fleet in relation with piracy threat might explain some changes in average weight in the catch observed in the early 2010s within the large areas used for assessing the status of the stocks. Future work will aim (i) to improve data collection from the identification of vessels that appear to report size data of poor quality and (ii) to select the good size data sets to be used in the future assessments of Indian Ocean yellowfin and bigeye tuna. The availability of operational data is key to determine the causes of discrepancy between data sources of tuna size and eventually improve the overall quality of management advice."*

68. The WPDCS **WELCOMED** the progress made in the analysis of size data available for Seychelles industrial longliners that provides insight into the sources of discrepancy observed between logbooks and size samples and **ENCOURAGED** Seychelles to continue the work in collaboration with the IOTC Secretariat.

69. The WPDCS **NOTED** that size data collected by some vessels appear to be spurious and that the temporal changes in average weight of the catch should be estimated from the subset of good quality data.

70. The WPDCS **REQUESTED** Seychelles to liaise with the Secretariat to understand the differences between size data available at SFA and at the Secretariat and **NOTED** that only size data considered of good quality should be provided to the Secretariat.

71. The WPDCS **NOTED** that Seychelles is in the process of improving the sampling protocols for size data which could include in the future some sampling of individual weights to reduce the variability in length measurements.

72. The WPDCS **RECOMMENDED** that a collaborative work on longline size frequency data gathering scientists from Taiwan,China, Japan, Seychelles and Korea could be conducted in 2017 in conjunction with the joint CPUE workshop, to compare the different data sets available and extract information useful for the future stock assessments of yellowfin, bigeye and albacore tuna.

73. The WPDCS also **NOTED** that the availability of operational data would be instrumental in the success of the work and **REQUESTED** Taiwan,China, Japan, Seychelles and Korea to share all operational data with the Secretariat under the Resolution 12/02 Data confidentiality policy and procedures in a similar way to what already done for collaborative CPUE analysis.

5.2.3 Improving the management of size-frequency data from European Union and assimilated purse seine fleets

74. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–18 which describes procedures to improve the management of European Union and assimilated Purse Seine fleets size-frequency as received by the Secretariat, including the following abstract provided by the authors:

> "*The purse seine (PS) fleet of the Indian Ocean developed from the early-1980s after some exploratory cruises. Initially based on the sampling protocol conducted for the European purse seine fleet of the Atlantic Ocean, sampling procedures of the PS catch in the Indian Ocean quickly adapted to the logistical constraints of unloading in Victoria (Seychelles) and evolved over the 1980s and 1980s with the expansion of the fishery. Consequently, sampling of size frequency data for tropical tunas caught by the European and assimilated purse seiners varied over time.* (…)" – see paper for full abstract

75. The WPDCS **NOTED** that sampling of the EU and assimilated purse-seine fleet started in the early 1980s, and the sampling protocol has changed throughout the 1980's becoming stable since 1990.

76. The WPDCS **NOTED** that the low sample sizes in 1998-2000 was due to the absence of supervision of the sampling teams in Victoria, Seychelles.

77. The WPDCS **NOTED** that the sampling protocol implemented from the late 1980's was designed to ensure random samples are taken from the catch, i.e. a well from a given stratum (area / quarter / school association) is first selected and 200-500 fish are randomly sampled from the well in two distinct rounds to avoid any stratification effect..

78. The WPDCS **AGREED** that there was no apparent issue with the catch size frequency data for the period from 1991 to 2015, and **REQUESTED** that the differences in size compositions derived from raw samples, raised samples and IOTC processed size data should be explored further.

79. The WPDCS **NOTED** paper IOTC-2016-WPDCS12-INF05 that provides updates on the relationship between fork length and total weight for yellowfin, bigeye, and skipjack caught with purse seine and **NOTING** that the current length-weight relationships adopted by IOTC tend to underestimate the weight at length for the two latter species **RECOMMENDED** that the new length – weight relationships replace the existing IOTC ones.

80. The WPDCS **NOTED** that the change in the relationships can have repercussions on the estimates of species composition for purse seine catch and **REQUESTED** the European Union and other purse seine fishing CPCs to explore the consequences of such changes on the time series of catch provided to the Secretariat.

81. Furthermore, the WPDCS **NOTED** that the Secretariat can play a role in the storage and rescue of raw morphometric data when available and **REQUESTED** the Secretariat to manage such data within the new integrated management system.

82. The WPDCS **NOTED** a number of issues with the current conversion factors and relationships (including length-weight, non-standard to standard length conversions) published by the IOTC Secretariat (e.g., equations based on low sample size, parameters retrieved from other oceans, and the necessity to account for gender or regional differentiation in conversion factors species, such as neritic tunas), and **REQUESTED** the IOTC Secretariat conducts a comprehensive review in collaboration with CPCs to improve the current IOTC conversion factors.

6. REVIEW OF DATA REQUIREMENTS IN CONSERVATION AND MANAGEMENT MEASURES RELEVANT TO THE WPDCS

6.1 Data reporting

6.1.1 Resolution 15/02 Mandatory statistical requirements for IOTC Members and Cooperating Non-Contracting Parties (CPCs)

83. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–19_Rev1 that provided additional considerations and comments on the existing definitions of relevant concepts such as total catch, bycatch and discard.

84. The WPDCS **ACKNOWLEDGED** the effort of IOTC Secretariat in reviewing the definition of nominal / retained catch, total catch, discard and bycatch, **NOTING** that the current definition of total catch does not account for catches that are neither discarded nor retained and landed (for instance retained catches for crew consumption, used as bait, etc.).

85. In order to collect this relevant information, that might be available at least for some of the large industrial fleets, the WPDCS also **REQUESTED** that form 1_RC is extended with the inclusion of an optional field used to specify the full range of different types of retained catch.

86. The WPDCS also **NOTED** that the existing definition of bycatch, as per IOTC glossary of terms, is not taking into account the notion of target / non-target species and that the latter information – for which a dedicated field is available within form 1_RC – is not provided by CPCs when submitting mandatory statistical information.

87. Therefore, the WPDCS **REQUESTED** that CPCs contribute to improvements in the collection of bycatch data by ensuring that target species information is regularly reported and by increasing the adoption of form 1_DI (or similar) to report all catches that are discarded either dead or alive.

88. Furthermore, the WPDCS **REQUESTED** that all CPCs that have historical data about species being targeted by their fisheries liaise with the Secretariat and provide anecdotal evidence of such information in order to properly complement the existing total catch time series.

89. The WPDCS also **NOTED** the conceptual model adopted by ICCAT in its field manual to describe all quantities involved in the determination of retained / total catch and **RECOMMENDED** that a similar approach is adopted and used to provide clearer, more formal definitions of the depicted relevant concepts.

6.1.2 Resolution 16/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock

90. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–20_Rev2 that analyses the requirements set forth by Resolution 16/01 and lists the CPCs and gears that might potentially be impacted by the Resolution.

91. The WPDCS **NOTED** that the Resolution applies to "*all fishing vessels targeting tuna and tuna like species in the Indian Ocean of 24 meters overall length and over, and those under 24 meters if they fish outside the EEZ of their flag State, within the IOTC area of competence*" and **ACKNOWLEDGED** that a number of fisheries important for yellowfin tuna catches reported in 2014 require further analysis prior to the determination of catch limits for 2017.

92. For this reason, the WPDCS **ACKNOWLEDGED** that a comprehensive breakdown of yellowfin tuna catches by fishery, particularly for fleets under 24 meters operating on both the high-seas and in coastal waters (and therefore contributing or not to the threshold) should be the responsibility of the involved CPCs.

93. The WPDCS **REQUESTED** that CPCs potentially subject to Resolution 16/01 provide the expected catch breakdown as a matter of urgency, **NOTING** that the Resolution will be effective starting on January 1st 2017.

94. Additionally, the WPDCS **NOTED** that Resolution 16/01 also calls for proper monitoring processes to be applied by involved CPCs in order to assess, in a timely manner and according to the requirements set forth by the Resolution, whether the level of Yellowfin tuna catches are reaching the limit during the year.

95. The WPDCS **RECOMMENDED** that a project be included in the WPDCS program of work to support CPCs in the improvement of their national data collection systems to support the implementation of Resolution 16/01 *On an interim plan for rebuilding the Indian Ocean Yellowfin tuna stock*; specifically estimates of fleet composition, time-area catches (and associated catches on the high seas for vessels under 24 metres), and efficiencies in the time required to assess the status of Yellowfin tuna catches.

6.2 Regional observer scheme

6.2.1 Resolution 11/04 On a regional observer scheme

6.2.2 Resolution 16/04 On the implementation of a pilot project in view of promoting the regional observer scheme of IOTC

96. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–22 Rev_1 which described a proposal for Resolution 16/04 *On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC*.

97. The WPDCS **ACKNOWLEDGED** this important initiative to increase the collection of fishery data for the provision of best available management advice.

98. The WPDCS **NOTED** that one of the work streams of the ROS pilot project is to implement a port sampling project for artisanal fisheries, i.e. for vessels < 24m fishing within the coastal EEZ, (which is already part of the WPDCS program of work IOTC-2015-WPDCS11-R, p25) and that this has also been suggested as an alternative for industrial fisheries (≥ 24m or high seas) (e.g.IOTC-2106-SC19-11).

99. However, the WPDCS **NOTED** that while this allows for the collection of information on retained catches/species, information on discards and interactions with bycatch species such as turtles, marine mammals and prohibited species will be missed.

100. Thus, the WPDCS **REQUESTED** that self-sampling and e-monitoring systems are also piloted alongside port sampling to enable the collection of data on discards and interactions with other species which are fundamental data for the progress of WPEB.

101. The WPDCS **NOTED** that observer training programs are available from other tuna RFMOs (e.g. WCPFC) and National Programs (e.g. EU PS observer program) and, thus, it would be worth to use those well-established observer training programs to more efficiently use the resources of the project.

102. Resolution 11/04 *On a Regional Observer Scheme* requests the submission of a report after each trip but the WPDCS **RECOMMENDED** that on the next revision of the Resolution, this should be amended to request the submission of data (instead of the observer trip report) with a given deadline so that information from multiple trips can be provided. The WPDCS also **NOTED** that once the electronic reporting system is developed and established observer information could be submitted by a certain deadline as it is done with Nominal Catch and Catch and Effort data.

103. The WPDCS **NOTED** that the capacity building and training component of observers and samplers at port is very important for successful implementation of the ROS, which should also consider the educational level of the samplers.

6.2.3 Discussion of observer coverage rates

6.2.4 Update on the implementation of the IOTC interim ROS templates

104. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–21 Rev_1 providing comments on IOTC observer data template from the National Research Institute of Far Seas Fisheries and Fisheries Agency of Japan.

105. The WPDCS **NOTED** that Japan requested CPCs to review the interim observer data template, and proposed that the first 5 items on the tori line information in Form Trip-LL (Trip information) need to be optional, the rational being that such information is not currently collected by many observer programmes for the tuna longline fisheries, and is also not requested in other tuna RFMOs.

106. The WPDCS **AGREED** that it is difficult for observers to record technical aspects of the tori line configurations and **DISCUSSED** the potential alternative for observers to collect information ('Yes' or 'No') on whether the tori lines conform to the minimum standards specified in Resolution 12/06.

107. The WPDCS **AGREED** that experiments which are specifically designed to test the effectiveness of particular mitigation measures are the ideal way to collect this information.

108. However, the WPDCS **AGREED** that this was more of a compliance requirement and that the ROS should focus on the collection of data for scientific purposes.

109. Due to the difficulties in collecting detailed data on tori line specifications, the WPDCS **RECOMMENDED** that the trip level data reporting requirements be amended to permit the reporting of this information as optional rather than mandatory, as detailed in paper IOTC-2016-WPDCS12-21_Rev_1, in the Observer Template (Form Trip-LL).

6.2.5 IOTC ROS capacity building activities in 2016 / 17

110. The WPDCS **NOTED** that details and updates on the ROS capacity building activities for 2016 / 2017 were discussed in relation to the implementation of the ROS Pilot Project (agenda item 6.2.2).

6.2.6 ROS E-reporting and E-monitoring projects

111. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–23 which described the minimum standards for the validation of the implementation of Electronic Monitoring System for the tropical tuna purse seine fleet, including the following abstract provided by the authors:

> "*On the basis of experience gained during many trial studies of EMS on-board purse seine vessels, this document presented a series of proposed standards for the use of EMS to monitor these fisheries. Taking into account that the IOTC Scientific Committee agreed in 2014 that standards for EM systems for purse seine and other gear types would need to be developed, and that recently Resolution 16/04 on the implementation of a pilot project in view of promoting the Regional Observer Scheme also aims to develop minimum standards for the implementation of Electronic observation systems and understand how they can be used to increase levels of observer coverage, the authors recommended that IOTC SC consider these draft standards in order to facilitate the use of this technology in the Indian Ocean. Both human observers and EMSs are complementary each with their own weaknesses and strengths. EMSs are still limited to a purely scientific monitoring program, covering all observers' tasks, especially with the collection of biological samples. However, EMS is valuable for vessels where it is difficult to place an observer onboard or to increase the coverage achieved by human observers.*"

112. The WPDCS **RECALLED** that IOTC Scientific Committee **agreed** in 2014 that standards for EMS for purse seine and other gear types should be developed. Moreover, Resolution 16/04 *On the implementation of a pilot project in view of promoting the ROS of IOTC* **REQUESTED** Scientific Committee to propose minimum standards for the implementation of Electronic observation systems and how they can be used to increase levels of observer coverage for Indian Ocean fisheries.

113. The WPDCS **NOTED** that Electronic Monitoring Systems (EMS) are currently being used by some tropical tuna purse seine vessels

114. Noting that EMS can complement onboard human observer programs and also collect other data that would be useful to the IOTC SC, the WPDCS **CONSIDERED** that it would be useful to ensure that the different systems are harmonized in terms of installation, data collection and reporting protocols, so as to ensure compatibility.

115. Thus, the WPDCS **NOTED** that the guidelines described in document IOTC-2016-WPDCS12-23 provide a useful starting point and **RECOMMENDED** these guidelines be adopted as a basis for defining minimum standards for tropical tuna purse seine fleets.

116. The WPDCS **NOTED** that two longline vessels (Taiwan,China) are currently involved in an EMS pilot project and that the results will be presented to the next WPDCS.

117. The WPDCS **NOTED** that Australia has implemented mandatory EMS coverage for their longline vessels operating more than 30 days per year, replacing the role of onboard human observers.

118. Nevertheless, the WPDCS **RECALLED** that Resolution 11/04 stipulates the use of onboard human observers[1] and, given that certain tasks such as biological sampling cannot be carried out with EMS (as noted by the SC in 2014), the WPDCS **AGREED** that EMS should be used to complement onboard scientific observers rather than replace them.

119. **NOTING** that EMS are being already tested in artisanal / small scale fisheries, the WPDCS **WELCOMED** the plans to develop EMS for the Indian Ocean gillnet fisheries as part of the pilot project.

120. The WPDCS **NOTED** the experiences of implementing EMS in small (< 24m) longline vessels in La Reunion which suggested that the technical aspects of EMS may be relatively straightforward compared with the challenge of getting acceptance from fishers to implement the systems on their vessels and so therefore adequate time and resources should be spent on communicating appropriately and effectively with fishers.

121. The WPDCS **NOTED** that a workshop on EMS was organized by WCPFC in 2015 and that ICCAT SCRS agreed that the same proposed minimum standards presented in paper 23 (ADD) provided a good start for the

[1] "Observer: a person who collects information on board fishing vessels". Resolution 11/04

implementation of the EMS and **ACKNOWLEDGED** the importance to assure standardization in the minimum standards among tuna RFMOs and that this could be discussed in future joint tuna RFMO meetings.

6.3 Data recording (logbooks)

6.3.1 Resolution 15/01 On the recording of catch and effort data by fishing vessels in the IOTC area of competence

6.3.2 Resolution 15/08 Procedures on a fish aggregating devices (FADs) management plan, including a limitation on the number of FADs, more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species

122. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–29 which compares observations and simulations of trajectories (Fish Aggregating Devices, surface drifters, mark-recapture experiment data) using the IT infrastructure of the EU Bluebridge project that provides services (e.g. web interface, grid computing power) managed in a scientific cloud, including the following abstract provided by the authors:

> "*This note presents some work related to simulations of FAD trajectories using observations of Drifters and simulations with a model (Ichthyop) driven by satellite products for sea surface currents (OSCAR). We have different goals in mind: predicting the areas where FAD could drift, probability of damaging coral by stranding in reefs areas*".

123. The WPDCS **NOTED** that FAD drifts appear to be very similar to that of oceanographic drifters at large scale but that the subsurface structure of the FAD could affect the drift patterns of FADs at smaller scales and, hence, the results of the simulations.

124. Thus, the WPDCS **REQUESTED** authors that this matter is analysed further to be presented to the next WPDCS or WPTT meeting.

125. The WPDCS also **NOTED** that further analyses using different combinations of simulation models and data inputs at smaller temporal/spatial scales would be useful to well assess the predictive capacity of the approach.

7. CAPACITY BUILDING ACTIVITIES: DATA COLLECTION AND PROCESSING IN COASTAL COUNTRIES, AND COMPLIANCE WITH MINIMUM REQUIREMENTS

7.1 Capacity Building Activities: Data Collection and Processing in Coastal Countries, and Compliance with Minimum Requirements

126. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–08 on the capacity building activities of the Secretariat in 2016 including the following abstract provided by the authors:

> "*Since its inception the Commission has allocated funds from its regular budget to assist developing coastal CPCs in the Indian Ocean in the implementation of the IOTC data requirements. In addition to the funds allocated by the Commission, the IOTC Secretariat has also secured funding from external sources; in recent years, funds sourced from third parties have been well above those allocated by the Commission. Since April 2002, the Overseas Fisheries Cooperation Foundation of Japan has been assisting developing coastal states in the IOTC Area of Competence with their statistical data collection, processing, and reporting systems, with a view to enhancing the capacity of institutions in those countries and improve their compliance with IOTC requirements for statistics and other scientific data used on the assessments of IOTC species. In recent years, the IOTC has also received substantial funding for capacity building activities from other sources, in particular the Bay of Bengal Large Marine Ecosystems Project (BOBLME), the IOC-SmartFish Project and, more recently, the GEF-Areas Beyond National Jurisdiction Project (ABNJ), and EU DG-Mare. This document presents the activities undertaken by the IOTC and its partners during the last year (2016), including those activities that will extend to 2016 and following years, where appropriate*".

127. The WPDCS **RECOMMENDED** that a capacity building workshop on R data extraction, manipulation and visualisation takes place in 2017, **NOTING** that IRD could have some funding for this work and that Sri Lanka has expressed strong interest in this type of activities.

128. The WPDCS **NOTED** the importance of data preparation meetings, such as the ICCAT model where they take place a few months prior to the meeting to assess the status of the stock, but **ACKNOWLEDGED** there is already a tight meeting schedule.

129. The WPDCS **AGREED** that data for the previous year do not always have to be included in assessment models, given that the timeframes for data submissions and provision to the stock assessment scientists are often tight and the additional data point may have limited effect on the assessment outcome (particularly for data poor species such as the billfish and neritic tunas).

130. The WPDCS **THANKED** the OFCF for the ongoing work taking place in North and West Sumatra Provinces in Indonesia to improve the collection and reporting of catch and size frequency data and **REQUESTED** that these activities are continued in 2017. Also, the WPDCS **ENCOURAGED** the Indonesian government to continue the sampling activity to ensure Indonesia has capacity to monitor artisanal fisheries and fulfil IOTC data reporting requirements.

131. The WPDCS **NOTED** that while IOTC provides more information on the issues with the regionally stored datasets than many tuna RFMOs, data are currently described predominantly in terms of timeliness and completeness although the actual quality is not assessed.

8. DATA COLLECTION STANDARDS FOR ARTISANAL FISHERIES

132. **NOTING** the Commission has stressed the need to improve arrangements for data collection and reporting in some developing coastal states in the IOTC area of competence, including arrangements for the monitoring of artisanal fisheries in those countries, the WPDCS **REQUESTED** the IOTC Secretariat to develop terms of reference in the WPDCS Program of Work to enable support to CPCs in terms of developing country-specific data collection protocols and implementation of sampling of artisanal fisheries.

9. FISHERIES INFORMATION SYSTEMS, INCLUDING DEVELOPMENTS IN THE NEW IOTC DATABASE AND DISSEMINATION

133. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–25_Rev1 which described the current stage of evolution in the development of the new Integrated IOTC database, including the following abstract provide by the authors:

> "*The current state of the art related to the internal IOTC core data management processes is described, depicting benefits and shortcomings as they emerged after more than one decade of adoption. Reasons for a radical change in the process implementation are listed, together with the improvements that the envisaged changes will bring to the internal data flow – as part of the Secretariat's daily operations – and outside its boundaries (targeting mostly scientists, data analysts, policy makers, country-level focal points as well as national and regional management bodies). The proposed changes aim at rationalizing the entire data management chain, all the way up from the data ingestion to the data dissemination steps, at the same time enabling data consumers to have a simpler and more effective way to get access to the data while still enforcing the confidentiality policies currently adopted by the Commission.* (…)" – see paper for full abstract.

134. The WPDCS **CONGRATULATED** the Secretariat for the objectives reached so far in this important task and **ACKNOWLEDGED** that, with the adoption of the revised data management workflow, the common processes implemented by the Secretariat should become fully streamlined and more efficient.

135. **ACKNOWLEDGING** that the new Integrated IOTC database has been designed to be remotely accessible, the WPDCS **NOTED** that this same approach could be successfully pursued in order to enable external users to have a more convenient and direct access to the information managed by the Secretariat.

136. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–26_Rev1 which described the metaphor of "data as resources" implemented by the services developed for the new Integrated IOTC database.

137. The WPDCS **NOTED** that with the recent developments introduced by the Secretariat, access to the relevant data sets and information (Nominal Catches, Catch-and-Effort, Size-Frequency etc.) is greatly enhanced for end users and scientists.

138. **ACKNOWLEDGING** that this work is still ongoing, and that further improvements and refinements are expected in the course of next year, the WPDCS also **NOTED** the relative simplicity through which scientists could take advantage of the remote services exposed by the new Integrated IOTC database to incorporate live data streams within their scripts.

139. At the same time, the WPDCS **NOTED** the emphasis in the adoption of common, text-based formats for structured data exchange (JSON, XML) which might require an initial learning curve for end users willing to exploit the functionalities of the new system.

140. Therefore, in order to simplify some of the common tasks required for the successful inclusion of these remote services within user scripts, the WPDCS **REQUESTED** that proper funding are allocated for the development of dedicated libraries in the most common languages used for statistical analysis (R, Python, JavaScript, etc.).

141. Also, the WPDCS **ACKNOWLEDGED** that further options should be explored for a successful integration of the remote services within external data collection and statistical systems, so as to possibly simplify and improve the submission of mandatory statistical information by CPCs.

142. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–27 which described a data toolbox for fisheries with a specific target on tuna fisheries, including the following abstract provided by the authors:

> "*Assessing the status of tuna and tuna-like populations for providing management advice requires the analysis of multiple data sets collected by the contracting parties and cooperating non-contracting parties of Tuna Regional Fisheries Management Organizations (tRFMOs) Conventions. Data on the magnitude and composition of landings, discards, and fishing effort are currently managed at basin scale by the Secretariats of the tRFMOs. Consequently, data formats and reference codes have evolved rather independently despite some links with the FAO Coordinating Working Party on Fishery Statistics. We have developed a global harmonized database for tuna fisheries data by collating the public domain datasets (total catch, monthly-spatially aggregated catch and effort, and catch at size) from IOTC, ICCAT, IATTC and WCPFC. The database – named SARDARA - currently covers the period 1919-2014 and is freely accessible online along with a set of open source codes (a « toolbox ») to handle the data, i.e. transform the data formats, load the standardized data into the database, and compute a suite of indicators (e.g. global maps of catch)* (…)" – see paper for full abstract.

143. The WPDCS **CONGRATULATED** the authors for the successful efforts in creating a global database of tuna fisheries, encompassing information collated from four tuna RFMOs across multiple oceans, and **NOTED** that the major issues being faced by the project were related to the difficulties in accessing the original data and harmonizing the data structure definitions.

144. The WPDCS **NOTED** the possibilities provided by the global database to seamlessly compare data from multiple sources and oceans in order to provide overall informative trends (e.g. the widespread increase of log-school catches compared to other school types).

145. **NOTING** that one of the key concept behind this project is data collation, the WPDCS **ACKNOWLEDGED** that the tools provided by the global database enable comparison and cross checking of information belonging to areas shared by multiple tuna RFMOs.

146. The WPDCS also **NOTED** that the goals of the global database are twofold, both scientific and methodological, aiming in particular at developing generic methods to improve transparency of data and processes (more visibility and improved access to data, ease use for all interested communities of users).

147. **ACKNOWLEDGING** that all tools and methodologies developed for this project are open-sourced, the WPDCS **NOTED** the accent on re-usability of the project outcomes and the possibility for end users to integrate and incorporate outputs of the project in a simple and repeatable way.

148. In particular, the WPDCS **ACKNOWLEDGED** that the recent efforts made by the IOTC Secretariat in enabling simpler and more effective access to their data is one of the key aspects to ensure the sustainability of the global tuna database and that the two activities are complementary rather than overlapping.

10. BDEP DATABASE INITIATIVE: BYCATCH DATA COLLECTION AND REPORTING BETWEEN TUNA RFMOS

149. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–28_Rev1 which described progress with applying the Bycatch Data Exchange Protocol (BDEP) template to data from IOTC fisheries.

150. The WPDCS **RECOMMENDED** that the SC request that the BDEP trial should continue in 2017 for the Indian Ocean and be resourced as needed, as a positive step towards improving the quality of and access to bycatch data within and across tRFMOs. The WPDCS also **NOTED** the need to be careful that data reported in the BDEP template are not extrapolated by multiplying reported bycatch numbers in the template by total effort which may result in inflated estimates of bycatch.

11. WPDCS PROGRAM OF WORK

11.1 Revision of the WPDCS Program of work (2017–2021)

151. The WPDCS **NOTED** paper IOTC–2016–WPDCS12–09 which provided an opportunity to consider and revise the WPDCS Program of Work (2017–2021), by taking into account the specific requests of the Commission, Scientific Committee, and the resources available to the IOTC Secretariat and CPCs.

152. The WPDCS **RECALLED** that the SC, at its 18h Session, made the following request to its working parties:

> "*The SC **REQUESTED** that during all future Working Party meetings, each group not only develop a Draft Program of Work for the next five years containing low, medium and high priority projects, but that all High Priority projects are ranked. The intention is that the SC would then be able to review the rankings and develop a consolidated list of the highest priority projects to meet the needs of the Commission. Where possible, budget estimates should be determined, as well as the identification of potential funding sources*." (SC17. Para 154)

153. The WPDCS **RECOMMENDED** that the Scientific Committee consider and endorse the WPDCS Program of Work (2017–2021), as provided at Appendix V.

154. The WPDCS **RECALLED** that, compared to staffing resources in other tRFMOS, the IOTC Secretariat is under-resourced and limited in its current capacity to provide support for the following core functions:

- Assist countries to facilitate reporting and improve compliance in terms IOTC mandatory statistical data collection and reporting requirements, including the Regional Observer Scheme.
- Improve the quality and transparency of data in the IOTC database, including documentation of data reviews and dataset processing procedures, development of data quality indicators and quantifying uncertainty in catch estimates.
- Provide technical support to countries in the region in establishing and maintaining statistical systems for collecting and reporting data to the IOTC, particularly in relation to sampling of artisanal fisheries.
- Support for new priorities identified by the Scientific Committee and Commission, including the Regional Observer Scheme pilot project, Electronic-monitoring, and implementation of Resolution 16/01 On an Interim Plan for Rebuilding the Indian Ocean Yellowfin tuna Stock in the IOTC area of competence.
- Dissemination of information on data-related Commission activities through the IOTC website, metadata, graphical representation of the data, and data exchange between tRFMOs and related organizations.

155. **NOTING** the very heavy workload at the IOTC Secretariat and the ever increasing demands by the Commission and the Scientific Committee, and also the capacity to respond to requests for assistance by countries, the WPDCS reiterated its previous **RECOMMENDATION** that the permanent staff of the IOTC Data and Science Section be increased by two (2) (1 x P4 and 1 x P3 level positions), supplemented by additional short-term consultants, to commence work by 1 January 2018 or earlier.

12. OTHER BUSINESS

12.1 Date and place of the 13th and 14th Sessions of the WPDCS: 2016 & 2017

156. The WPDCS **THANKED** Seychelles for hosting the 12th Session of the WPDCS and commended the IOTC Secretariat on the warm welcome, the excellent facilities and assistance provided to participants in the organisation and running of the Session.

157. The WPDCS **REQUESTED** that the IOTC Secretariat liaise with CPCs to determine the host country for the 13th and 14th sessions of the WPDCS respectively (Table 1).

Table 1. Draft meeting schedule for the WPDCS (2017 and 2018)

	2017			2018		
Meeting	**No.**	**Date**	**Location**	**No.**	**Date**	**Location**
Working Party on **Data Collection and Statistics** (WPDCS)	13th	TBD	Sri Lanka (TBC)	14th	TBD	TBD

12.2 Review of the draft, and adoption of the report of the 12th Session of the WPDCS

158. The WPDCS **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPDCS12, provided at Appendix VII.

159. The report of the 12th Session of the Working Party on Data Collection and Statistics (IOTC–2016–WPDCS12–R) was **ADOPTED** on the 30 November 2016.

APPENDIX I
LIST OF PARTICIPANTS

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APPENDIX II
AGENDA FOR THE 12TH WORKING PARTY ON DATA COLLECTION AND STATISTICS

Date: 28th – 30th November 2016
Location: Seychelles
Venue: Eden Blue Hotel conference room, Eden Island
Time: 09:00 – 17:00 daily

Chair: Dr Emmanuel Chassot (EU,France); **Vice-Chair:** Mr Stephen Ndegwa (Kenya)

1. **OPENING OF THE MEETING** (Chair)
2. **ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION** (Chair)
3. **THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS** (IOTC Secretariat)
   - 3.1 Outcomes of the 18th Session of the Scientific Committee and of the 20th Session of the Commission
   - 3.3 Review of Conservation and Management Measures relevant to the WPDCS
   - 3.4 Progress on the recommendations of WPDCS11
4. **PROGRESS REPORT OF THE SECRETARIAT ON DATA RELATED ISSUES** (IOTC Secretariat)
   - 4.1 IOTC Secretariat Report
   - 4.2 Dissemination of IOTC data sets and documents
     - 4.2.1 IOTC Data Summary: Update
     - 4.2.2 Tagging database: Update
     - 4.2.3 IOTC website data pages: Discussion of potential improvements
5. **UPDATE ON NATIONAL STATISTICAL SYSTEMS** (CPCs)
   - 5.1 Update on national statistical systems, including the main challenges in collecting and reporting data to the IOTC Secretariat and proposals to improve future levels of compliance with IOTC data requirements.
   - 5.2 Further analysis of length frequency data and likely impacts on the assessments (IOTC Secretariat & CPCs)

6 REVIEW OF DATA REQUIREMENTS IN CONSERVATION AND MANAGEMENT MEASURES RELEVANT TO THE WPDCS (IOTC Secretariat)

- 6.1 Data reporting (to the IOTC Secretariat)
  - 6.1.1 Resolution 15/02 *On mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)*
  - 6.1.2 Resolution 16/01 *On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock*
- 6.2 Regional Observer Scheme
  - 6.2.1 Resolution 11/04 *On a regional observer scheme*
  - 6.2.2 Resolution 16/04 *On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC*
  - 6.2.3 Discussion of observer coverage rates
  - 6.2.4 Update on implementation of the IOTC interim ROS templates
  - 6.2.5 IOTC ROS capacity building activities in 2016/17
  - 6.2.6 ROS E-reporting and E-monitoring projects

6.3 Data recording (logbooks)

6.3.1 Resolution 15/01 *On the recording of catch and effort data by fishing vessels in the IOTC area of competence*

6.3.2 Resolution 15/08 *Procedures on a fish aggregating devices (FADs) management plan, including a limitation on the number of FADs, more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species*

7 CAPACITY BUILDING ACTIVITIES: DATA COLLECTION AND PROCESSING IN COASTAL COUNTRIES, AND COMPLIANCE WITH MINIMUM REQUIREMENTS (IOTC Secretariat)

8 DATA COLLECTION STANDARDS FOR ARTISANAL FISHERIES

9 FISHERIES INFORMATION SYSTEMS, INCLUDING DEVEOPMENTS IN THE NEW IOTC DATABASE AND DISSEMINATION (Chair & IOTC Secretariat)

10 BDEP DATABASE INITIATIVE: BYCATCH DATA COLLECTON AND REPORTING BETWEEN TUNA RFMOs

11 WPDCS PROGRAM OF WORK (Chair & IOTC Secretariat)

11.1 Revision of the WPDCS Program of Work 2017–2021

12 OTHER BUSINESS

12.1 Date and place of the 13th and 14th Sessions of the WPDCS: 2017 & 2018 (Chair)
12.2 Review of the draft, and adoption of the report of the 12th Session of the WPDCS (Chair)

APPENDIX III
LIST OF DOCUMENTS

Document	Title	Availability
IOTC–2016–WPDCS12–01a	Draft: Agenda of the 12th Working Party on Data Collection and Statistics	✓(26 September 2016) ✓(28 October 2016)
IOTC–2016–WPDCS12–01b	Draft: Annotated agenda of the 12th Working Party on Data Collection and Statistics	✓(26 September 2016) ✓(26 November 2016)
IOTC–2016–WPDCS12–02	Draft: List of documents of the 12th Working Party on Data Collection and Statistics	✓(26 September 2016) ✓(26 November 2016)
IOTC–2016–WPDCS12–03	Outcomes of the 18th Session of the Scientific Committee (IOTC Secretariat)	✓(31 October 2016)
IOTC–2016–WPDCS12–04	Outcomes of the 20th Session of the Commission (IOTC Secretariat)	✓(31 October 2016)
IOTC–2016–WPDCS12–05	Review of current Conservation and Management Measures relating to the WPDCS (IOTC Secretariat)	✓(31 October 2016)
IOTC–2016–WPDCS12–06	Progress on the recommendations of WPDCS11 (IOTC Secretariat)	✓(2 November 2016) ✓(10 November 2016)
IOTC–2016–WPDCS12–07_Rev1	Report on IOTC Data Collection and Statistics (IOTC Secretariat)	✓(11 November 2016)
IOTC–2016–WPDCS12–08	IOTC capacity building activities in support of developing coastal IOTC CPCs (IOTC Secretariat)	✓(18 November 2016)
IOTC–2016–WPDCS12–09	Revision of the WPDCS Program of Work (2017–2021) (IOTC Secretariat, Chairperson & Vice-Chairperson)	✓(2 November 2016) ✓(10 November 2016)
IOTC–2016–WPDCS12–10	Success, challenges and lessons learnt in changing of data collection system in Kenya (Ndegwa S)	✓(13 November 2016)
IOTC–2016–WPDCS12–11	A review of Iran's basic implementations to improving Data Collection and Statistics in 2014-2015 (Khorshidi Nergi S)	✓(8 November 2016)
IOTC–2016–WPDCS12–12	Toward Improving Data Collection on Tuna Landings in Malaysia (Samsudin B, Sallehudin J, Effarina M.F. and Nor Azlin M)	✓(9 November 2016)
IOTC–2016–WPDCS12–13	Assessment of the status of data collection and reporting of artisanal fisheries in Mozamibque (Mutombene R, Chauca I and Chacate O)	✓(13 November 2016)
IOTC–2016–WPDCS12–14	Electronic logbook and electronic data verification module to enhance the standards of High Seas fisheries management process of Sri Lanka (Gunawardane N.D.P.)	✓(13 November 2016)
IOTC–2016–WPDCS12–15	Observer onboard program in Thailand under a national policy for marine fisheries management (Wongkeaw A, Lirdwitayaprasit P and Luesrithavornsin P)	✓(13 November 2016)
IOTC–2016–WPDCS12–16	Consideration on the difference of average weight by estimation method for tunas caught by Japanese longline in the Indian Ocean (Matsumoto T)	✓(13 November 2016)
IOTC–2016–WPDCS12–17	Review of the size-frequency data collected from Seychelles industrial longliners during 2007-2015 (Lucas J, Assan C, Lucas V, Issac P, Geehan J, Chassot E)	✓(15 November 2016)
IOTC–2016–WPDCS12–18	Improving the management of European Union and assimilated Purse Seine fleets size-frequency data received by the Secretariat (Chassot E, Fiorellato F, Geehan J)	✓(26 November 2016)
IOTC–2016–WPDCS12–19_Rev1	Considerations about alternative definitions of total catches, discards and bycatch and their possible impact on the IOTC data submission forms (IOTC Secretariat)	✓(10 November 2016) ✓(26 November 2016)
IOTC–2016–WPDCS12–20_Rev2	Implications on data collection and reporting for IOTC Contracting Parties and Cooperating Non-Contracting Parties subject to catch reductions according to Resolution 16/01 (IOTC Secretariat)	✓(11 November 2016) ✓(29 November 2016)

Document	Title	Availability
IOTC–2016–WPDCS12–21_Rev1	Comments on IOTC observer data template (National Research Institute of Far Seas Fisheries and Fisheries Agency of Japan)	✓(13 November 2016) ✓(18 November 2016)
IOTC–2016–WPDCS12–22_Rev1	A pilot project for the IOTC Regional Observer Scheme (IOTC Secretariat)	✓(14 November 2016)
IOTC–2016–WPDCS12–23	Minimum standards for the implementation of Electronic Monitoring Systems for the tropical tuna purse seine fleet (Ruiz J, Krug I, Justel-Rubio A, Restrepo V, Hammann G, Gonzalez O, Legorburu G, Pascual Alayon P-J, Bach P, Bannerman P, Galán T)	✓(10 November 2016)
IOTC–2016–WPDCS12–24	Revision of the Spanish Fish Aggregating Device Management Plan: new FAD logbook proposal (Soto M, Abascal F, Pascual P, Ramos L, Lopez J, Justel-Rubio A, Ruiz J, Goñi N, Alvariño L, Herrera M, Grande M and Rubio R)	[WITHDRAWN]
IOTC–2016–WPDCS12–25_Rev1	Improving the core IOTC data management processes (IOTC Secretariat)	✓(13 November 2016) ✓(18 November 2016)
IOTC–2016–WPDCS12–26_Rev1	Data as resources: how to enhance data sharing capabilities between the Secretariat and the scientific community (IOTC Secretariat)	✓(13 November 2016) ✓(18 November 2016)
IOTC–2016–WPDCS12–27	Data toolbox for fisheries: the case of tuna fisheries (Taconet P, Chassot E, Guitton J, Palma C, Fiorellato F, Anello E, Barde J)	✓(14 November 2016)
IOTC–2016–WPDCS12–28_Rev1	A bycatch data exchange protocol for the Indian Ocean (IOTC Secretariat)	✓(25 October 2016) ✓(13 November 2016)
IOTC–2016–WPDCS12–29	Modeling trajectories of Fish Aggregating Devices with satellite images: Use cases related to Fisheries (Imzilen T, Lett C, Chassot E, Barde J)	✓(17 November 2016)
Information papers		
IOTC-2016-WPDCS12-INF01	Resolution 16/01 *On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock*	✓(31 October 2016)
IOTC-2016-WPDCS12-INF02	Resolution 16/04 *On the implementation of a pilot project in view of promoting the Regional Observer Scheme of IOTC*	✓(31 October 2016)
IOTC-2016-WPDCS12-INF03	Resolution 16/06 *On measures applicable in case of non-fulfilment of reporting obligations in the IOTC*	✓(31 October 2016)
IOTC-2016-WPDCS12-INF04	Statistics of the Purse Seine Spanish fleet in the Indian Ocean (1990-2015) (Soto M, Fernandez F)	✓(14 November 2016)
IOTC-2016-WPDCS12-INF05	Length-weight relationships for tropical tunas caught with purse seine in the Indian Ocean: Update and lessons learned (Chassot E, Assan C, Esparon J, Tirant A, Delgado de Molina A, Dewals P, Augustin E, Bodin N)	✓(26 November 2016)
IOTC-2016-WPDCS12-INF06	Proposals for improved figures in the tropical tunas statistical summaries (Fonteneau A, Marsac F)	✓(26 November 2016)
IOTC-2016-WPDCS12-INF07	Note on the size frequencies of the YFT & BET catches by PS used in the SS3 model (Fonteneau A)	✓(26 November 2016)
Data		
IOTC-2016-WPDCS12-DT01_Rev1	Sample R scripts	✓(13 November 2016) ✓(23 November 2016)
IOTC-2016-WPDCS12-DT02_Rev1	Sample JavaScript scripts	✓(13 November 2016) ✓(23 November 2016)

APPENDIX IV
MAIN DATA ISSUES IDENTIFIED BY THE WPDCS AND ACTIONS PROPOSED TO ADDRESS THEM

Nominal catches	
Main Issues	**Proposed Actions**
Indonesia: Total catch of Artisanal fisheries Species composition: Catch of small tunas around anchored FADs (*rumpons*)	• IOTC Secretariat to conduct an evaluation of IOTC-OFCF pilot sampling results, and implications for revisions of catch by species for artisanal fisheries in the IOTC database. • Continue collaboration with DGCF and support for the pilot project sampling, to ensure Indonesia has capacity to monitor artisanal fisheries and fulfill IOTC data reporting requirements.
Sri Lanka: Coastal and offshore fisheries	• IOTC Secretariat to continue support for Sri Lanka, primarily through development of the Regional Observer Scheme. • Explore options for piloting of ROS E-Reporting and Electronic monitoring in Sri Lanka to improve the estimates of catches by species, and bycatch.
Yemen: Handline fishery	• FAO data to be used in the interim; the IOTC Secretariat to explore options for further improvements in the catch estimates, dependent on staff resources.
India: Commercial longline fishery Coastal fisheries	• India has indicated that the IOTC shall use official figures irrespective of how incomplete they may be • Conflicting catches reported by India's national fisheries institutions continue to be noted by the IOTC Secretariat, and brought to the attention of the IOTC WP and SC.
Pakistan: Driftnet fishery	• Conflicting catches reported by Pakistan, which need to be explored fully by the IOTC Secretariat before incorporation in the IOTC database. • ABNJ-WWF Project crew-based observer pilot initiated in 2014. • IOTC Secretariat to request WWF/Pakistan to formally submit the data for review by IOTC, to assist with improving the quality of catch estimates.
Madagascar: Coastal and longline fisheries	• Need to attempt estimate catch using the data available. • Provide assistance in the sampling of artisanal fisheries
Catches of bigeye tuna by baitboat (**Maldives**) and coastal fisheries (**Malaysia**)	• Consider the implementation of pilot sampling to assess species composition and strengthen shore sampling. • Review of the historical catch series, e.g., using the results of tagging, to improve the estimates for earlier years. Scheduling of a Data Support mission to Maldives post-WPNT 2017 (TBC).
Catch-and-Effort	
Main Issues	**Proposed Actions**
Implementation of minimum requirements for operational data (logbook)	
Indonesia: Longline	• Need to strengthen management and validation of logbook data – particularly inconsistencies with VMS data and issues of low reporting rates of submitted logbooks (around ≈5%).

Sri Lanka: Gillnet and longline fishery	• Need to strengthen management and validation of logbook data and assistance for implementation of electronic logbooks.
India & **Malaysia** & **Oman** Longlines **I.R. Iran** & **Pakistan**: Driftnets **Maldives**: Pole-and-line	• Data falls short of requirements: As part of the IOTC Data Compliance and Support missions, provide assistance to CPCs to understand the IOTC data requirements and processing of information and urge them to strictly implement requirements and report data to the IOTC.
Most fisheries	• Implement minimum data requirements for sharks (noting that those for India are different as it has objected the logbook Resolution)
Catch-and-effort not available for coastal fisheries	
Many CPCs have failed to report catches and effort per month for their coastal fisheries	• As a minimum request reports of catch by species, gear, and month and total numbers of fishing craft operated by gear, and month (or year).

Observer Schemes	
Main Issues	**Proposed Actions**
Observer reports: Very poor rates of reporting	• Explore ways to facilitate reporting of data using the new IOTC Electronic Reporting tools. • Organise ROS Training and Workshops to assist CPCs with implementation of the ROS data reporting requirements. • Implement pilot study of electronic monitoring in coastal fisheries
Size Frequency	
Data not reported	
Coastal fisheries of **India**, **Indonesia**, **Malaysia**, **Oman**, **Yemen**, and longlines of **India**	• Data Mining/assist CPCs to understand data requirements/support to pilot sampling and with processing of information and urge them to strictly implement requirements and report data to the IOTC.
Driftnets of **Pakistan**	• ABNJ-WWF Project crew-based observer pilot initiated in 2014. • IOTC Secretariat to request WWF/Pakistan to formally submit the data for review by IOTC, to assist with improving the quality of catch estimates.
Data poor quality	
Longline fisheries of **Japan** and **Taiwan,China**: Catch-and-effort and size data conflicting over the time series	• Proposal for a collaborative work (involving Taiwan,China, Japan, and Seychelles) to compare operational level size data to resolve longstanding inconsistencies between average weights derived from length frequencies and catch-and-effort, and between fleets operating in comparable time-area strata.
Data not by IOTC standards for the gillnet & longline fishery of **Sri Lanka** and the driftnet fishery of **I.R. Iran**	• Assist CPCs to understand data requirements and with processing of information and urge them to strictly implement requirements and report data to the IOTC
Socio-Economic Data	
Little data available	• Propose standards for the reporting of data, as requested in the IOTC Agreement including the adoption of form 7_PR

APPENDIX V
WORKING PARTY ON DATA COLLECTION AND STATISTICS PROGRAM OF WORK (2017–2021)

The Program of Work consists of the following, noting that a timeline for implementation would be developed by the SC once it has agreed to the priority projects across all of its Working Parties:

Table 1. Priority topics for obtaining the information necessary to deliver the necessary advice to the Commission.

Topic	Sub-topic and project	Priority ranking	Lead	Est. budget (potential source)	Timing				
					2017	2018	2019	2020	2021
1. Data Collection Standards - ROS	**1.1** Artisanal fisheries	**1**							
	1.1.1 For countries that are known for already having well established sampling systems in place, assess the outcomes / review the projects and proceed with immediate actions and support (if needed).			**(TBD)**					
	1.1.2 Assessment of the status of all countries whose sampling systems are not fully known or established.			**(TBD)**					
	1.1.3 Develop minima data requirements for the routine collection of data at the landing place, through sampling by enumerators			**(TBD)**					
	1.1.4 Develop General Guidelines for data collection from artisanal fisheries; including development of a set of indicators to be used to assess the quality of data collection and management systems for artisanal fisheries			**(TBD)**					
	1.1.5 Develop/Amend Fisheries specific data collection protocols, by country, where necessary			**(TBD)**					
	1.1.6 Assist implementation of pilot sampling activities in countries/fisheries not/insufficiently sampled in the past; priority to be given to the following fisheries: 1. Coastal fisheries of Indonesia 2. Coastal fisheries of Pakistan 3. Coastal fisheries of Sri Lanka			**(TBD)**					

	4. Coastal fisheries of Yemen 5. Coastal fisheries of Madagascar 6. Coastal fisheries of Comoros 7. Coastal fisheries of Tanzania 8. Coastal fisheries of Thailand 9. Coastal fisheries of Malaysia						
	1.2 Industrial fisheries	**1**					
	1.2.1 Develop General Guidelines for data collection by at-sea observers; including development of a set of indicators to be used to assess the quality of data collection and management systems for industrial fisheries	(**TBD**)					
	1.2.2 Organize a Regional Workshop on the Implementation of the IOTC Regional Observer Scheme	US$ **TBD** (**DG-MARE**)					
	1.2.3 Develop/Amend fisheries specific at-sea observer data collection protocols, by country, where necessary	US$ **20K** (**TBD**)					
	1.2.4 Assist implementation of at-sea observer schemes in countries/fisheries not/insufficiently monitored in the past; including: • Evaluation of existing observer schemes and arrangements • Coordination of country/fishery specific Training Sessions and Workshops on the ROS • Assistance to data management and reporting Priority to be given to the following fisheries: 1. Iran (driftnet; purse seine) 2. Sri Lanka (purse seine; drifting gillnet & longline) 3. Indonesia (longline) 4. Pakistan (driftnet) 5. India (longline) 6. Mauritius (purse seine; longline)	(**TBD**)					

2.	Assistance to CPCs for the fulfillment of Resolution 16/01 mandate	**2.1** Provide support to identified CPCs to increase their level of monitoring and reporting in accordance with paragraph 8 of Resolution 16/01	**1**	US$ **40K** (**TBD** – **EU grant 2017**)					
3.	Review Size Data Longline Fisheries	**3.1** Assistance to historical review of length frequency data for longline fisheries, in particular longliners from Taiwan,China and Japan.	**1**	US$ **40K** (**TBD**)					
4.	Compliance with IOTC Data Requirements	**4.1** Data support missions	**2**						
		4.1.1 Identification of indicators to assess performance of IOTC CPCs against IOTC Data Requirements; evaluation of performance of IOTC CPCs with those Requirements; development of plans of action to address the issues identified, including timeframe of implementation and follow-up activities required.		US$ **25K** (**EU DG-MARE**)					
5.	Implementation Data Collection Sport Fisheries	**5.1** Produce a catalogue of sport fisheries in the Indian Ocean; facilitate collection and reporting of data from sport clubs; training of local staff.	**4**	US$ **75K** (**EU-DG MARE**)					
6.	IOTC Data access	**6.1** Design and implementation of a metadata catalog to describe information and processes made available by IOTC followed by the development of software libraries (in the most widely adopted languages for statistical analysis, e.g. R, Python etc.) to simplify scientists' access to IOTC Remote data services.	**3**	US$ **20K** (**TBD**)					

APPENDIX VI
CONSOLIDATED RECOMMENDATIONS OF THE 12TH SESSION OF THE WORKING PARTY ON DATA COLLECTION AND STATISTICS

Note: Appendix references refer to the Report of the 12th Session of the Working Party on Data Collection and Statistics (IOTC–2016–WPDCS12–R)

Further analysis of length frequency data and likely impacts on the assessments

WPDCS12.01 (para. 72): The WPDCS **RECOMMENDED** that a collaborative work on longline size frequency data gathering scientists from Taiwan,China, Japan, Seychelles and Korea could be conducted in 2017 in conjunction with the joint CPUE workshop, to compare the different data sets available and extract information useful for the future stock assessments of yellowfin, bigeye and albacore tuna.

WPDCS12.02 (para. 79): The WPDCS **NOTED** paper IOTC-2016-WPDCS12-INF05 that provides updates on the relationship between fork length and total weight for yellowfin, bigeye, and skipjack caught with purse seine and **NOTING** that the current length-weight relationships adopted by IOTC tend to underestimate the weight at length for the two latter species **RECOMMENDED** that the new length – weight relationships replace the existing IOTC ones.

Resolution 15/02 Mandatory statistical requirements for IOTC Members and Cooperating Non-Contracting Parties (CPCs)

WPDCS12.03 (para. 89): The WPDCS also **NOTED** the conceptual model adopted by ICCAT in its field manual to describe all quantities involved in the determination of retained / total catch and **RECOMMENDED** that a similar approach is adopted and used to provide clearer, more formal definitions of the depicted relevant concepts.

Resolution 16/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock

WPDCS12.04 (para. 95): The WPDCS **RECOMMENDED** that a project be included in the WPDCS program of work to support CPCs in the improvement of their national data collection systems to support the implementation of Resolution 16/01 *On an interim plan for rebuilding the Indian Ocean Yellowfin tuna stock*; specifically estimates of fleet composition, time-area catches (and associated catches on the high seas for vessels under 24 metres), and efficiencies in the time required to assess the status of Yellowfin tuna catches.

Resolution 16/04 On the implementation of a pilot project in view of promoting the regional observer scheme of IOTC

WPDCS12.05 (para. 102): Resolution 11/04 *On a Regional Observer Scheme* requests the submission of a report after each trip but the WPDCS **RECOMMENDED** that on the next revision of the Resolution, this should be amended to request the submission of data (instead of the observer trip report) with a given deadline so that information from multiple trips can be provided. The WPDCS also **NOTED** that once the electronic reporting system is developed and established observer information could be submitted by a certain deadline as it is done with Nominal Catch and Catch and Effort data.

Update on the implementation of the IOTC interim ROS templates

WPDCS12.06 (para. 109): Due to the difficulties in collecting detailed data on tori line specifications, the WPDCS **RECOMMENDED** that the trip level data reporting requirements be amended to permit the reporting of this information as optional rather than mandatory, as detailed in paper IOTC-2016-WPDCS12-21_Rev_1, in the Observer Template (Form Trip-LL).

ROS E-reporting and E-monitoring projects

WPDCS12.07 (para. 115): Thus, the WPDCS **NOTED** that the guidelines described in document IOTC-2016-WPDCS12-23 provide a useful starting point and **RECOMMENDED** these guidelines be adopted as a basis for defining minimum standards for tropical tuna purse seine fleets.

Capacity Building Activities: Data Collection and Processing in Coastal Countries, and Compliance with Minimum Requirements

WPDCS12.08 (para. 127): The WPDCS **RECOMMENDED** that a capacity building workshop on R data extraction, manipulation and visualisation takes place in 2017, **NOTING** that IRD could have some funding for this work and that Sri Lanka has expressed strong interest in this type of activities.

BDEP Database initiative: bycatch data collection and reporting between tuna RFMOs

WPDCS12.09 (para. 150): The WPDCS **RECOMMENDED** that the SC request that the BDEP trial should continue in 2017 for the Indian Ocean and be resourced as needed, as a positive step towards improving the quality of and access to bycatch data within and across tRFMOs. The WPDCS also **NOTED** the need to be careful that data reported in the BDEP template are not extrapolated by multiplying reported bycatch numbers in the template by total effort which may result in inflated estimates of bycatch.

Revision of the WPDCS Program of work (2017–2021)

WPDCS12.10 (para.153): The WPDCS **RECOMMENDED** that the Scientific Committee consider and endorse the WPDCS Program of Work (2017–2021), as provided at Appendix V.

WPDCS12.11 (para. 155): **NOTING** the very heavy workload at the IOTC Secretariat and the ever increasing demands by the Commission and the Scientific Committee, and also the capacity to respond to requests for assistance by countries, the WPDCS reiterated its previous **RECOMMENDATION** that the permanent staff of the IOTC Data and Science Section be increased by two (2) (1 x P4 and 1 x P3 level positions), supplemented by additional short-term consultants, to commence work by 1 January 2018 or earlier.

Review of the draft, and adoption of the report of the 12th Session of the WPDCS

WPDCS12.12 (para.158): The WPDCS **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPDCS12, provided at Appendix VII.